

Patent claims:

1. A system for interferometric fit testing of a specimen having an aspherical surface in reflection, the specimen being a segment (footprint) of a rotationally symmetrical basic body (parent), comprising an interferometer and a diffractive optical element (DOE), wherein an optical axis of the interferometer in the beam direction behind the diffractive optical element and an axis of rotation of the basic body form an angle that differs from zero, and the diffractive optical element being designed in such a way that the rays produced by the interferometer and falling into the diffractive optical element strike the specimen perpendicularly and from there run back in themselves.
2. The system as claimed in claim 1, wherein, between the interferometer and the diffractive optical element, there is a reference surface for producing a reference wave required for an interferogram, non-rotationally symmetrical interferometer errors being determined before the fit testing, after which the specimen is measured in an order of diffraction differing from zero ($m \neq 0$), the non-rotationally symmetrical errors of the specimen with respect to the optical axis of the interferometer being used to draw conclusions about the rotationally symmetrical errors of the basic shape.
3. The system as claimed in claim 1, wherein the wave striking a CGH of the diffractive optical element is provided as a planar wave.

4. The system as claimed in claim 3, wherein the test wave strikes the diffractive optical element at an angle.
5. The system as claimed in claim 1, wherein the wave striking a CGH of the diffractive optical element is provided as a spherical wave.
- 10 6. The system as claimed in claim 5, wherein a refractive front-end optical system is provided between the reference surface and the diffractive optical element.
- 15 7. The system as claimed in claim 6, wherein the refractive front-end optical system is of aplanar design.
8. The system as claimed in claim 3, wherein the CGH is formed as a chromium mask.
- 20 9. The system as claimed in claim 5, wherein the CGH is formed as a chromium mask.
- 25 10. The system as claimed in claim 8 or 9, wherein the CGH is designed as an amplitude hologram or as a phase hologram.
11. The system as claimed in claim 1, wherein the light source used is a frequency-stabilized laser.
- 30 12. The system as claimed in claim 1 or 10, wherein a current light wavelength is determined by a wavelength measuring instrument or indirectly via a

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determination of air temperature, air pressure or atmospheric humidity, and measurement errors caused by deviations from the desired value are eliminated from the measured result.

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13. The system has claimed in claim 5, wherein a line density of the CGH can be chosen such that the CGH can be written sufficiently accurately by scalar optical diffraction methods.

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14. A system for the interferometric fit testing of a specimen having an aspherical surface in reflection, the specimen being a segment (footprint) of a rotationally symmetrical basic body (parent), comprising an interferometer and a diffractive optical element (DOE), wherein an optical axis of the interferometer in the beam direction behind the diffractive optical element and an axis of rotation of the basic body form an angle that differs from zero, the diffractive optical element being designed in such a way that the rays produced by the interferometer and falling into the diffractive optical element strike the specimen perpendicularly and from there run back in themselves and, to determine the non-rotationally symmetrical interferometer errors in the zeroth order of diffraction, a planar plate is provided as specimen.

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15. The system as claimed in claim 14, wherein, between the interferometer and the diffractive optical element, there is a reference surface for producing a reference wave required for an interferogram, non-rotationally symmetrical interferometer

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errors being determined before the fit testing, after which the specimen is measured in an order of diffraction differing from zero ($m \neq 0$), the non-rotationally symmetrical errors of the specimen with respect to the optical axis of the interferometer being used to draw conclusions about the rotationally symmetrical errors of the basic shape.

10 16. The system as claimed in claim 14, wherein the wave striking a CGH of the diffractive optical element is provided as a planar wave.

15 17. The system as claimed in claim 16, wherein the test wave strikes the diffractive optical element at an angle.

18. A system for the interferometric fit testing of a specimen having an aspherical surface in reflection, the specimen being a segment (footprint) of a rotationally symmetrical basic body (parent), comprising an interferometer and a diffractive optical element (DOE), wherein an optical axis of the interferometer in the beam direction behind the diffractive optical element and an axis of rotation of the basic body form an angle that differs from zero, the diffractive optical element being designed in such a way that the rays produced by the interferometer and falling into the diffractive optical element strike the specimen perpendicularly and from there run back in themselves and, to determine the non-rotationally symmetrical interferometer errors in the zeroth order

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of diffraction, a spherical mirror is provided as specimen.

19. The system as claimed in claim 18, wherein, between the interferometer and the diffractive optical element, there is a reference surface for producing a reference wave required for an interferogram, non-rotationally symmetrical interferometer errors being determined before the fit testing, after which the specimen is measured in an order of diffraction differing from zero ($m \neq 0$), the non-rotationally symmetrical errors of the specimen with respect to the optical axis of the interferometer being used to draw conclusions about the rotationally symmetrical errors of the basic shape.
20. The system as claimed in claim 18, wherein the wave striking a CGH of the diffractive optical element is provided as a spherical wave.
21. The system as claimed in claim 20, wherein the test wave strikes the diffractive optical element at an angle.
22. The system as claimed in claim 21, wherein a refractive front-end optical system is provided between the reference surface and the diffractive optical element.
23. The system as claimed in claim 22, wherein the refractive front-end optical system is of aplanar design.

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24. A system for the interferometric fit testing of a specimen having an aspherical surface in reflection, the specimen being a segment (footprint) of a rotationally symmetrical basic body (parent) for
5 a mirror optical system in EUV-lithography, comprising an interferometer and a diffractive optical element (DOE), wherein an optical axis of the interferometer in the beam direction behind the diffractive optical element and an axis of rotation
10 of the basic body form an angle that differs from zero, and the diffractive optical element being designed in such a way that rays produced by the interferometer and falling into the diffractive optical element strike the specimen perpendicularly and from there run back in themselves.
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25. The system as claimed in claim 23, wherein, between the interferometer and the diffractive optical element, there is a reference surface for producing a reference wave required for the interferogram, non-rotationally symmetrical interferometer errors being determined before the fit testing, after which the specimen is measured in an order of diffraction differing from zero ($m \neq$
20 0), the non-rotationally symmetrical errors of the specimen with respect to the optical axis of the interferometer being used to draw conclusions about the rotationally symmetrical errors of the basic shape.
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